



**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. FAA-2016-4158; Special Conditions No. 25-656-SC]**

**Special Conditions:** Bombardier Inc. Model BD-700-2A12 and BD-700-2A13 Airplanes; Fuselage In-Flight Fire Safety and Flammability Resistance of Aluminum-Lithium Material.

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for the Bombardier Inc. (Bombardier) Model BD-700-2A12 and BD-700-2A13 airplanes. These airplanes will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is a fuselage fabricated using aluminum-lithium materials instead of conventional aluminum. The applicable airworthiness regulations do not contain adequate or appropriate fire-safety standards for this design feature. These special conditions contain the additional fire-safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**DATES:** Effective **[INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**.

**FOR FURTHER INFORMATION CONTACT:** Alan Sinclair, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98057-3356; telephone 425-227-2195; facsimile 425-227-1320.

## **SUPPLEMENTARY INFORMATION:**

### **Background**

On May 30, 2012, Bombardier applied for an amendment to Type Certificate No. T00003NY to include the new Model BD-700-2A12 and BD-700-2A13 airplanes. These airplanes are derivatives of the Model BD-700 series of airplanes and are marketed as the Bombardier Global 7000 (Model BD-700-2A12) and Global 8000 (Model BD-700-2A13). These airplanes are twin-engine, transport-category, executive-interior business jets. The maximum passenger capacity is 19 and the maximum takeoff weights are 106,250 lb. (Model BD-700-2A12) and 104,800 lb. (Model BD-700-2A13).

### **Type Certification Basis**

Under the provisions of Title 14, Code of Federal Regulations (14 CFR) 21.101, Bombardier must show that the Model BD-700-2A12 and BD-700-2A13 airplanes meet the applicable provisions of the regulations listed in Type Certificate No. T00003NY, or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

In addition, the certification basis includes other regulations, special conditions, and exemptions that are not relevant to these special conditions. Type Certificate No. T00003NY will be updated to include a complete description of the certification basis for these airplane models.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Model BD-700-2A12 and BD-700-2A13 airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Model BD-700-2A12 and BD-700-2A13 airplanes must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.101.

### **Novel or Unusual Design Feature**

Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes will incorporate the following novel or unusual design feature: The fuselage will be fabricated using aluminum-lithium alloy materials instead of conventional aluminum.

### **Discussion**

The Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes will be fabricated using aluminum-lithium materials. The performance of airplanes consisting of a conventional aluminum fuselage, in an in-flight, inaccessible-fire scenario, is understood based on service history, and extensive intermediate- and large-scale fire testing. Experience has shown that eliminating fire propagation of the interior and insulation materials tends to increase survivability because other aspects of in-flight fire safety (e.g., toxic-gas emission and smoke obscuration) are typically byproducts of the propagating fire. The fuselage itself does not contribute to in-flight fire propagation. This may not be the case for a fuselage fabricated from aluminum-lithium

materials. Therefore, special conditions are necessary so that the Model BD-700-2A12 and BD-700-2A13 airplanes provide protection against in-flight fires propagating along the surface of the fuselage.

In the past, fatal in-flight fires have originated in inaccessible areas of airplanes where thermal or acoustic insulation was located adjacent to the airplane's aluminum fuselage skin. Research revealed that this area has been the path for flame propagation and fire growth. The FAA determined, in five incidents in the 1990s, that unexpected flame spread along thermal and acoustic insulation-film covering material, raising concerns about the fire performance of this material. In all cases, the ignition source was relatively modest and, in most cases, was electrical in origin (e.g., electrical short circuit, arcing caused by chafed wiring, ruptured ballast case, etc.).

In 1996, the FAA Technical Center began a program to develop new fire-test criteria for insulation films directly relating to in-flight fire resistance. This development program resulted in a new test method—the radiant-panel test—and also resulted in test criteria specifically established for improving the in-flight fire ignition and flame propagation of thermal and acoustic insulation materials based on actual, on-board fire scenarios.

The FAA determined that a test similar to the test for the measurement of insulation burnthrough resistance (14 CFR part 25, Appendix F, Part VII, "Test Method to Determine the Burnthrough Resistance of Thermal/Acoustic Insulation Materials") could be used to assess the flammability characteristics of the proposed fuselage aluminum-lithium material. The only change to the test is the size of the sample and the sample holder, to accommodate panels of the fuselage material.

Bombardier must use the test method contained in Part VII of Appendix F, Test Method, for determining the burnthrough resistance of thermal-acoustic insulation materials, with the

slight changes to the sample size and sample holder, as described in these special conditions, to show that the aluminum-lithium material complies with applicable requirements.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

## **Discussion of Comments**

Notice of Proposed Special Conditions No. 25-16-06-SC for the Bombardier Model BD-700-2A12 and BD-700-2A11 airplanes was published in the Federal Register on October 26, 2016 (81 FR 74348). One comment was received.

The commenter acknowledged that the use of the aluminum-lithium alloy would require full certification to the existing regulations. However, they contend that the material is not novel and unusual and does not require special conditions.

The FAA does not agree. While it is true that, with materials presently tested, the proposed aluminum-lithium alloy does not appear to pose a significant risk, the existing regulations and guidance do not adequately address the use of this specific alloy technology.

Therefore, special conditions are required until the regulations are amended to provide sufficient requirements for the application of this new alloy technology.

## **Applicability**

As discussed above, these special conditions are applicable to Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes. Should Bombardier apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to the other model as well.

## **Conclusion**

This action affects only a certain novel or unusual design feature on Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes. It is not a rule of general applicability and affects only the applicant who applied to FAA for approval of this feature on the airplane.

## **List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

## **The Special Conditions**

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes.

1. Bombardier must demonstrate that the aluminum-lithium material has equal or better flammability-resistance characteristics than the aluminum-alloy sheet material typically used as skin material on similar airplanes.
2. The test set-up and methodology must be in accordance with the tests described in 14 CFR part 25, Appendix F, Part VII, except for the following.
  - a. Each test sample must consist of a flat test specimen. A set of three samples of aluminum-lithium sheet material must be tested. The size of each sample must be 16 inches wide by 24 inches long by 0.063 inch thick.
  - b. The test samples must be installed into a steel-sheet subframe with outside dimensions of 18 inches by 32 inches. The subframe must have a 14.5-inch by

22.5-inch opening cut into it. The tests samples must be mounted onto the subframe using 0.250-20 UNC threaded bolts.

- c. Test specimens must be conditioned at  $70^{\circ}\text{F} \pm 5^{\circ}\text{F}$ , and  $55\% \pm 5\%$  humidity, for at least 24 hours before testing.

- 3. The aluminum-lithium material must not ignite during any of the tests.

Issued in Renton, Washington, on April 3, 2017.

/s/

Michael Kaszycki  
Assistant Manager, Transport Airplane Directorate  
Aircraft Certification Service  
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